Geophysical Research Abstracts,
Vol. 11, EGU2009-5929, 2009
EGU General Assembly 2009

Validation of High-Resolution, Multi-Satellite Sea Surface Temperature

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Maps of sea surface temperature (SST) at a high resolution of 1 to 2 km are being produced at the Jet Propulsion Laboratory along with several other SST analysis centers for research and operational uses. These maps are usually produced by combining heterogeneous SST data sets including satellite-based measurements from different sensors. The microwave (MW) sensors have typically coarser 25-km resolution than the infra-red (IR) sensors which can resolve down to a 1-km scale. On the other hand, the IR-based measurements are prone to data voids due to cloud contamination, which does not affect MW sensors nearly as much. Combination of these data sets can be shown to be complementary, contributing to accuracy of the blended SST maps. Satellite-based SST values from all sensors to date, however, can be biased due to atmospheric conditions such as aerosol concentration as well as calibration issues unique to each sensor. The level of bias can often be larger than the root-mean-squares error of 0.3 to 0.5 degrees Celsius for typical satellite SST measurements. Moored and drifting buoy SST (in addition to in-situ IR radiometer data where available) are often used for reduction of bias in the satellite data. In this study, we use such buoy data to calibrate as well as to validate the blended satellite SST maps over the Gulf of Mexico and Gulf Stream region of the North Atlantic through a set of cross validation and time series analyses.